A STUDY OF SENSATIONS IN MOTOR PARALYSIS OF CEREBRAL ORIGIN BASED UPON THIRTY-FIVE CASES.*

By Alfred Gordon, M.D., of Philadelphia.

INSTRUCTOR IN NERVOUS DISEASES, JEFFERSON MEDICAL COLLEGE.

The question concerning the relationship of motor and sensory localizations is still unsettled, notwithstanding the considerable number of data accumulated in the literature. The doctrine of the sensori-motor area as one localization, as well as the doctrine of localizations separate for motor and sensory functions, is ardently defended by equally prominent authorities on either side. The subject as it stands now, although far from being solved, is nevertheless so far advanced that conclusions regarding one of the two functions cannot be drawn, unless a study of the other is made at the same time.

Disturbed functions, motor and sensory, of cerebral origin, may be due to cortical, subcortical, capsular, peduncular, or pontine lesions. The problem of localizations is therefore vast; its solution is as yet surrounded with a mystery.

The author of the present contribution attempted to approach one portion of this difficult problem, and while he does not pretend to solve the question in its entirety for want of pathological material, at least basing himself upon facts demonstrates with evidence, the clinical aspect of one of the views held by one of the two schools.

The study of the subject was undertaken by the writer without any preconceived idea, and without the slightest inclination towards one or the other view held by authorities in this country or abroad. His aim was to determine in the most impartial manner the condition of sensations in motor paralysis of cerebral origin.

The thirty-five cases were examined with the utmost care: selection was made of cases with perfect, or good mental lucidity, so that the question put to them be correctly answered. Cases of doubtful nature were not taken in the series. Also were excluded those cases which in addition to the motor cerebral symptoms presented symptoms of spinal diseases or of local affections.

---

*Read before the Philadelphia Neurological Society, October 28, 1902.

Each case was examined repeatedly on the same and the following day. Considerable time was spent in repeated attempts to mislead the patient in order to verify the answers; the results were uniform. Finally a reëxamination of all the cases was made a month later and to my great surprise the data collected proved to be exactly the same as at the first examination.

One word more about my method: Every case was examined in regard to hysteria, and in order to attribute the sensory disturbances to their real cause, all cases with hysterical stigmata, except one, were excluded.

SUMMARY OF THIRTY-FIVE CASES OF HEMIPLEGIA STUDIED FOR DISTURBANCES OF SENSATION AT THE PHILADELPHIA HOSPITAL AND JEFFERSON COLLEGE HOSPITAL.

Case I, No. 12. Infirmary. John Veasey, aged seventy-six. Complete right hemiplegia of one and a half years' duration. Movement in leg better than in arm.

Sensations: Upper limb—Touch anesthesia, which disappears at the root of the limb; pain, analgesia from fingers to elbow; to heat anesthesia, to cold anesthesia from fingers to elbow, above, hypesthesia.

Trunk—Touch normal, pain hypalgesia, to heat hypesthesia, to cold hypesthesia.

Lower limb—Touch anesthesia; pain, hyperesthesia from toes to knee, above hypesthesia; to heat hypesthesia, to cold hypesthesia.

Face—Touch normal, pain analgesia, to heat hypesthesia, to cold hypesthesia.

Astereognosis is complete. Position of upper limb is normal, special senses are normal, no paresthesia.

Case II, No. 5. Infirmary. Joseph Laselle, seventy-three years old. Complete right hemiplegia a year ago. Arm in contracture. Some movements in the leg.

Sensations: Upper extremity—touch anesthesia, pain hypalgesia on all aspects of the limb. From the fingers up hypalgesia becomes less marked towards the root of the limb where pain is normal. Heat not felt at all, to cold hyperesthesia.

Trunk—Touch anesthesia, pain hypalgesia. To heat normal, to cold hyperesthesia.

Lower extremity—Touch anesthesia, pain hypalgesia. To heat anesthesia, to cold hyperesthesia.

Face—Touch normal, pain analgesia. To heat normal, to cold hyperesthesia.

Astereognosis is complete. Position of paralyzed arm: patient cannot find the paralyzed limb. Special senses: hearing impaired on the right side. Paresthesia present.

Case III, No. 10. Infirmary. Gottlieb Schneider, sixty years of age, shoemaker. Complete left hemiplegia of seven years' duration. Some movements present, more in arm than in leg.

Sensation: Upper limb—Touch normal, pain hypalgesia (slight); pain becomes normal at the root of the limb. Heat taken for cold, to cold normal.

Lower limb—Touch normal, pain hyperalgesia, heat taken for cold, to cold normal.

Patient states that he was totally anesthetic to all sensations for a long time, but they gradually returned when motion improved.

Trunk—Touch normal, pain hypalgesia, to heat hypesthesia, to cold hyperesthesia.

Face—Pain, touch and temperature normal.

Astereognosis for small objects is present. Position of paralyzed limbs can be determined with the normal limbs. Special senses are normal, no paresthesia.

Case IV, No. 17. Infirmary. Frank Morbock, aged fifty-three years, laborer. Complete right hemiplegia with some impairment of speech of six months' duration. Motion is better in the lower than in upper limb.

Sensations: Upper limb—Touch normal, pain hypalgesia (this is equal at the end and root of the limb); to heat hypesthesia (becomes normal at the root of the limb), to cold hypesthesia.

Trunk—Touch normal, pain normal, to heat hypesthesia, to cold normal.

Face—Pain, touch and temperature normal.

Astereognosis is present for small objects; cannot recognize size and material of an object. Position of arm is not easily recognized with the normal limb. No paresthesia. Special senses normal.

Case V, No. 30. Infirmary. Michael Mooney, about seventy-five years of age, plasterer. Complete right hemiplegia of one year's duration. Some movement in the arm, but none in leg.

Sensations: Upper limb—Touch hypesthesia (slight), pain hypalgesia (slight), to heat hypesthesia, to cold hypesthesia (slight).

Trunk—Touch hypesthesia, pain normal, to heat hypesthesia, to cold normal.

Lower limb—Touch hypesthesia and delay, pain hypalgesia, to heat anesthesia, to cold hypesthesia from toes to knee, above, normal.

Face—Touch normal, pain hypalgesia, to heat hypesthesia, to cold normal.

Astereognosis absent. Paresthesia absent. Special senses: Hearing is equally impaired on both sides. Left pupil is larger than right.

Case VI, No. 15. Infirmary. Herman Schmidt, aged sixty years, machinist. Complete left hemiplegia of eleven months' duration. Arm and leg almost entirely without movements.

Sensations: Upper limb—Touch hypesthesia, pain, delay from fingers to wrist; above, analgesia. To heat anesthesia, to cold anesthesia.

Trunk—Touch normal, pain analgesia in some areas, hypalgesia in others. To heat anesthesia, to cold hypesthesia.

Lower limb—Touch normal, pain hypalgesia and delay, to heat anesthesia, to cold hypesthesia.

Face—Touch hypesthesia and delay, pain normal, heat taken for cold, to cold normal.

Astereognosis is present for every form. Paresthesia present (cramp-like sensation and numbness). Special senses: Hearing lost on paralyzed side, left pupil sluggish to light.

Case VII, No. 31. Infirmary. John Edwards, aged fifty-nine years, sailor. Complete right hemiplegia of four months' duration. Movement is present to some extent in arm and leg.

Sensations: Upper limb—Touch normal, pain hypo (slight), to heat normal, cold taken for heat.

Trunk—Touch normal, pain and temperature normal.

Lower limb—Touch normal, pain normal; to heat delay on foot, above normal; cold taken for heat from ankle up, normal on foot.

Face—Touch normal, pain and temperature normal.

Astereognosis absent. Position of paralyzed arm cannot be found with the normal limb. Special senses normal. Paresthesia absent. Hospital record shows analgesia and astereognosis. Patient says sensation improved when movement improved.

Case VIII, No. 29. Infirmary. Charles Bratton, aged sixty years, laborer. Complete right hemiplegia of a few days' duration. Movements improved, arm in better condition than leg.

Sensations: Upper limb—Touch normal, pain normal, to heat normal, to cold normal.

Trunk—Touch normal, pain normal and temperature normal.

Leg—Touch normal, pain hypalgesia, to heat hypoesthesia, to cold normal.

Face—Touch normal, pain hypalgesia, to heat normal, to cold normal.

Astereognosis absent. Position of paralyzed limbs recognized. Special senses normal. No paresthesia.

Case IX, No. 22. Infirmary. John McAnally, aged seventy years, laborer. Complete right hemiplegia of seven years' duration. (Leg only slightly involved.) Movements improved. Speech impaired.

Sensations: Upper limb—Touch normal, pain normal.

Thorax, lower limb and face normal to touch, pain and temperature.

Position of paralyzed arm could not be determined. Astereognosis absent. Special senses normal. No paresthesia.

Case X, No. 32. Infirmary. Adolph Schultz, aged thirty-eight years, laborer. Complete left hemiplegia of five months' duration. Movements are better in leg than in arm.

Sensations: Upper limb—Touch hypesthesia (slight), pain hypalgesia (slight), to heat and cold normal.

Trunk—Touch normal, pain hypalgesia, to heat and cold normal.

Lower limb—Touch normal, pain hypalgesia, temperature normal.

Face—Touch and pain normal, temperature normal.

Astereognosis absent. Position of paralyzed limbs not easily recognized. Special senses normal. No paresthesia.

Case XI, No. 2. Women's Ward. Jane Blair, aged eighty-two years. Complete right hemiplegia of three and one half years' duration. Movements in leg much better than in arm.

Sensations: Upper limb—Touch normal, pain hypalgesia on posterior aspect, normal on anterior; to heat hypesthesia on arm and forearm, normal on hand, to cold normal.

Trunk—Touch hypesthesia, pain normal, to heat and cold normal.

Lower limb—Touch normal, pain normal and temperature normal.

Face—Touch and pain normal, to heat normal, to cold hypesthesia.

Astereognosis is present only for consistency of objects. Special senses normal. No paresthesia.

Case XII, No. 4. Women's Ward. Mary Doyle, aged fifty-two years. Left hemiplegia (except face) of one year's duration. Movements much improved in leg, in arm no movements.

Sensations: Upper limb—Touch and pain normal; heat taken for cold from elbow up, normal below, except a few areas of hypesthesia, to cold normal.

Trunk—Touch normal, pain hypalgesia, heat taken for cold, to cold normal.

Lower limb—Touch normal, pain hypalgesia, to heat normal, to cold normal.

Astereognosis present only for size of small objects. Position easily recognized.

Case XIII, No. 24. Women's Ward. Annie Moore, aged forty-eight years. Complete left hemiplegia of four years' duration. Movements better in leg than in arm.

Sensations: Upper limb—Touch normal, pain hypalgesia and delay, to heat hypesthesia (marked), to cold almost anesthesia.

Trunk—Touch hypesthesia, pain hypalgesia, heat taken for cold, cold taken for heat.

Lower limb—Touch hypesthesia, pain hypalgesia, to heat normal, to cold hypesthesia.

Face—Touch hypesthesia, pain hypalgesia, to heat normal, to cold hypesthesia.

Astereognosis very marked for consistency, shape and size of objects. Position cannot be recognized. No paresthesia. Special senses normal.

Case XIV, No. 26. Women's Ward. Alice Facett, aged forty-nine years. Complete right hemiplegia, impairment of speech. Movements are present somewhat in leg, none in arm.

Sensations: Upper limb—Touch hypesthesia, pain analgesia, to heat hypesthesia (marked), to cold hypesthesia (marked).

Trunk—Touch anesthesia, pain analgesia, to heat normal, to cold hypesthesia.

Lower limb—Touch hypesthesia, pain analgesia (almost), to heat and cold anesthesia.

Face—Touch anesthesia, pain analgesia, to heat and cold hypesthesia.

Astereognosis is present. Position impossible to determine. No paresthesia. Special senses normal.

Case XV, No. 19. Women's Ward. Mary Ford, aged seventy-two years. Complete left hemiplegia of five months' duration. Movements improved considerably; more power in leg than in arm.

Sensations: Upper limb—Touch hypesthesia, pain hypalgesia, to heat and cold hypesthesia.

Trunk—Touch normal, pain hypalgesia, to heat normal, to cold hypesthesia.

Lower limb—Touch normal, pain normal, to heat and cold hypesthesia.

Face—Touch normal, pain hypalgesia, to heat normal, to cold hypesthesia.

Astereognosis present. Position is not easily recognized. Special senses are normal. No paresthesia.

Case XVI. No. 18. Women's Ward. Rachel Brandon, aged forty years. Complete left hemiplegia of four years' duration. Movements improved more in leg than in arm.

Sensations: Upper limb—Touch hypesthesia, pain hypalgesia, to heat and cold hypesthesia.

Trunk—Touch hypesthesia, pain hypalgesia, to heat and cold hypesthesia (slight).

Lower limb—Touch and pain hypesthesia, to heat and cold hypesthesia (slight).

Face—Touch, temperature and pain hypesthesia (slight).

Astereognosis present. Position can easily be recognized. No paresthesia. Special senses normal.

Case XVII, No. 14. Women's Ward. Theresa Gallaguer, aged sixty-eight years. Complete right hemiplegia of one year's duration. Movements improved much in leg, but very little in upper limb.

Sensations: Upper limb—Touch hypesthesia, pain hypalgesia, to heat and cold hypesthesia.

Trunk—Touch hypesthesia, pain hypalgesia, to heat and cold hypesthesia (slight).

Lower limb—Touch normal, pain hypalgesia from foot up to knee, above normal; to heat and cold hypesthesia from foot to knee, above normal.

Face—Touch normal, pain hypalgesia, to heat hypesthesia, to cold normal.

Astereognosis present; recognizes shape and consistency, but not object. Position easily recognized. Special senses normal.

Case XVIII, No. 2. Women's Ward. Mary Griffin, aged eighty-five years. Right hemiplegia of twenty-three years' duration. Movements improved in leg, but arm contracted.

Sensations: Upper limb—Touch normal, pain normal, to heat and cold normal.

Trunk—Touch and pain normal, to heat and cold hypesthesia.

Lower limb—Touch, temperature and pain normal.

Astereognosis is present; recognizes size, but not shape, and cannot tell name of object. No paresthesia.

Case XIX, No. 20. Women's Ward. Catherine Boyle, aged fifty-five years. Complete right hemiplegia of one and one half years' duration. Movements improved; upper limb in better condition than lower.

Sensations: Upper limb—Touch normal, pain hypalgesia, heat taken for cold on inner surface, hypesthesia on external aspect, to cold hypesthesia (slight).

Trunk—Touch normal, pain hypalgesia (slight), to heat hypesthesia, to cold normal.

Lower limb—Touch normal, pain hypalgesia (slight), to heat and cold hypesthesia.

Face—Touch normal, pain hypalgesia (slight), to heat hypesthesia (slight), to cold normal.

Astereognosis present: does not recognize size of objects. Position is not easily recognized. Paresthesia present. Special senses normal.

Case XX, No. 26. Women's Ward. Mary Jesse, aged forty-six years. Complete right hemiplegia of eighteen months' duration. Movements are better in arm than in leg, which is contracted.

Sensations: Upper limb—Touch anesthesia, pain analgesia, to heat anesthesia, to cold anesthesia in hand, hypesthesia in forearm, returns to normal at the root.

Trunk—Touch anesthesia, pain analgesia, to heat anesthesia, to cold some areas anesthesia, some areas hypesthesia, in some areas taken for heat.

Lower limb—Touch anesthesia, pain analgesia, to heat and cold anesthesia, but returns to normal towards the hip.

Face—Touch hypesthesia, pain analgesia, to heat anesthesia, to cold hypesthesia.

Patient has pharyngeal anesthesia, color-fields for white and red contracted. Astereognosis is present. Position not well recognized. Special senses: right pupil large and sluggish to light, gray degeneration of both optic nerves, more in temporal halves. Paresthesia present.

Case XXI, No. 25. Women's Ward. Anna Williams, aged sixty-two years. Complete right hemiplegia of four months' duration. Movements are better in leg than in arm.

Sensations: Upper limb—Touch hypesthesia (marked), pain analgesia, to heat anesthesia on fingers, above hypesthesia; cold taken for heat.

Trunk—Touch hypesthesia, pain hypalgesia, to heat and cold hypesthesia.

Lower limb—Touch hypesthesia, pain hypalgesia (slight), to heat hypesthesia (slight), to cold normal.

Astereognosis present: recognizes size with difficulty and cannot recognize objects. Position not easily recognized. Special senses: hearing impaired on paralyzed side. Paresthesia present.

Case XXII, No. 15. Women's Ward. Eva Bodge, aged twenty-six years. Complete left hemiplegia since the age of three months. Movements are better in leg, but fairly good in both.

Sensations: Upper limb—Touch normal, pain hypalgesia, to heat hypesthesia, to cold normal.

Trunk and lower limb—Touch, temperature and pain normal.

Face—Normal to three sensations.

Astereognosis present for recognizing objects. Position not easily recognized. Special senses normal. No paresthesia. Marked stigmata of hysteria present. Epileptic seizures since infancy (age three months).

Case XXIII, No. 11. Women's Ward. Mary Bowe, aged sixty-eight years. Complete right hemiplegia of three years' duration. Movements improved, better in leg than in arm.

Sensations: Upper limb—Touch hypesthesia, pain hypalgesia, to heat hypesthesia, to cold hypesthesia (slight).

Trunk—Touch and pain normal, to heat hypesthesia, to cold normal.

Lower limb—Touch, temperature and pain normal.

Face—Normal for three sensations.

Astereognosis present: cannot tell objects. Position not easily recognized. Special senses normal. No paresthesia.

Case XXIV, No. 15. Ward I. Richard Pryor, aged fifty-five years, laborer. Complete right hemiplegia (slight) of two months' duration. Arm in much better condition than leg.

Sensations: Upper limb—Touch hypesthesia, pain hypalgesia, to heat and cold hypesthesia.

Trunk—Touch normal, pain hypalgesia, to heat and cold hypesthesia.

Lower limb—Touch normal, pain hypalgesia, to cold hypesthesia on foot and thigh, normal on leg, to heat hypesthesia.

Face—Touch normal, pain hypalgesia, to heat and cold hypesthesia.

Astereognosis present: does not recognize objects. Position is easily recognized. Special senses normal. No paresthesia.

Case XXV, No. 15. Ward II. Thomas Daly, aged fifty-nine years, engineer. Complete left hemiplegia of one year's duration. Movements better in leg than in arm; in both movements are fair.

Sensations: Upper limb—Touch hypesthesia, pain hypalgesia, to heat anesthesia, cold taken for heat.

Trunk—Touch hypesthesia, pain hypalgesia, to heat hypesthesia, cold taken for heat.

Lower limb—Touch hypesthesia, pain hypalgesia (marked), to heat anesthesia, cold taken for heat.

Face—Touch hypesthesia, pain hypalgesia, heat taken for cold, cold taken for heat.

Astereognosis present. Position easily recognized. Special senses normal. No paresthesia.

Case XXVI, No. 9. Ward I. Samuel Butters, aged forty-four years, dentist. Complete left hemiplegia of three years' duration. Movements better in arm than in leg; in both limbs movements are slight.

Sensations: Upper limb—Touch hyperesthesia, pain hypalgesia, to heat hypesthesia from wrist above, below normal, to cold hypesthesia from wrist above, normal below.

Trunk—Touch and pain hypesthesia, to heat normal, to cold hypesthesia (slight).

Lower limb—Touch normal, pain hypalgesia, to heat hypesthesia (slight), to cold hypesthesia.

Astereognosis present for shape of objects. Special senses are impaired: hearing is somewhat impaired. No paresthesia.

Case XXVII, No. 17. Ward I. Colin McPherson, aged sixty years. Complete left hemiplegia of six years' duration. Movements better in leg than in arm; fairly good in both.

Sensations: Upper limb—Touch hypesthesia, pain normal, to heat hypesthesia on forearm, normal above and below, to cold normal.

Trunk—Touch, temperature and pain normal.

Lower limb—Touch and pain normal, to heat and cold hypesthesia.

Face—Touch, temperature and pain normal.

Astereognosis present: cannot recognize objects. Position easily recognized. Special senses: slightly deaf on the paralyzed side. Paresthesia present.

Case XXVIII, No. 14. Ward II. James Egan, aged seventy-four years, baker. Complete left hemiplegia of four and a half years' duration. Movements very much improved in arm and leg, better in leg.

Sensations: Upper limb—Touch anesthesia, pain hypalgesia, to cold hypesthesia (slight), to heat anesthesia from wrist up, hypesthesia below.

Trunk—Touch anesthesia, pain hypalgesia, heat taken for cold, to cold hypesthesia.

Lower limb—Touch anesthesia, pain hypalgesia (marked), to heat anesthesia, to cold hypesthesia.

Face—Touch normal, pain hypalgesia, to heat anesthesia, to cold hypesthesia.

Astereognosis present: does not recognize objects and their consistency. Position not easily recognized. Paresthesia present. Special senses: hearing impaired.

Case XXIX, Ward V. Peter Kunsick, aged fifty-seven years, machinist. Complete left hemiplegia of two years' duration. Movements better in leg than arm.

Sensations: Upper limb—Touch hypesthesia, pain hypalgesia, to heat hypesthesia, to cold hyperesthesia.

Trunk—Touch hypesthesia, pain hypalgesia, to heat hypesthesia, to cold hyperesthesia.

Lower limb—Touch hypesthesia, pain hypalgesia, to heat hypesthesia, to cold hypesthesia, except on ankle, where it is taken for heat.

Face—Touch normal, pain hypalgesia, to heat hypesthesia, to cold hyperesthesia.

Astereognosis present for size and objects. Position not easily recognized. Special senses involved; hearing impaired. Pupil smaller than on other side. Paresthesia present.

Case XXX. Ward III. Isaac Jacobs, aged fifty-two years, porter. Complete left hemiplegia of eighteen months' duration. Movements better in leg than in arm.

Sensations: Upper limb—Touch hypesthesia, pain hypalgesia, to heat anesthesia, to cold hypesthesia.

Trunk—Touch normal, pain hypalgesia, to heat hypesthesia (slight), to cold normal.

Lower limb—Touch normal, pain hypalgesia, to heat normal, to cold hypesthesia.

Face—Touch and pain normal, to heat and cold hypesthesia (slight).

Astereognosis present. Position easily recognized. Special senses normal. No paresthesia.

Case XXXI, No. 7. Ward III. James Howard, aged sixty-two years. Complete left hemiplegia of two years' duration. Movements slightly improved in arm, but no movements in leg.

Sensations: Upper limb—Touch hypesthesia (slight), pain hypalgesia, to heat and cold hypesthesia.

Trunk—Touch hypesthesia, pain hypalgesia (marked), to heat hypesthesia (marked), cold taken for heat.

Lower limb—Touch hypesthesia, pain hypalgesia, to heat and cold hypesthesia.

Face—Touch hypesthesia, pain hypalgesia (slight), to heat hypesthesia (marked), to cold hypesthesia.

Astereognosis present, position not easily recognized. Special senses: slight impairment of hearing. Paresthesia present.

Case XXXII, No. 24. Ward V. Jeremiah Boland, aged seventy-two years. Complete right hemiplegia of seven years' duration. Moves arm fairly well, the leg very little.

Sensations: Upper limb—Touch hypesthesia, pain hypalgesia, to heat and cold hypesthesia.

Trunk—Touch normal, pain hypalgesia, to heat and cold hypesthesia.

Lower limb—Touch normal, pain hypalgesia, to heat and cold hypesthesia.

Face—Touch normal, pain hypalgesia, to heat and cold hyperesthesia.

Astereognosis very slight. Position not easily recognized. Special senses: hearing impaired, right pupil larger than left. No paresthesia.

Case XXXIII, No. 17. Ward V. J. M. McGranan, aged fifty-nine years, carpenter. Complete left hemiplegia of seven years' duration. Movements are absent in arm and leg.

Sensations: Upper limb—Touch hypesthesia, pain hypalgesia (marked), to heat hypesthesia (marked), cold taken for heat.

Trunk—Touch hypesthesia (slight), pain hypalgesia (marked), to heat anesthesia, to cold hypesthesia (marked).

Lower limb—Touch hypesthesia, pain hypalgesia, heat taken for cold, to cold hypesthesia (marked).

Face—Touch, temperature and pain hypesthesia.

Astereognosis present. Position easily recognized. Special senses: hearing impaired. Left pupil smaller. Paresthesia present.

Case XXXIV. Hollon Boyd, aged forty-two years, Jefferson Hospital. Complete hemiplegia of eight years' duration. Movements in leg much better than in arm.

Sensations: Upper limb—Touch hypesthesia, pain hypalgesia, to heat hypesthesia, cold taken for heat.

Trunk—Touch hypesthesia, pain hypalgesia, to heat hypesthesia in some areas, in others taken for cold; cold normal.

Lower limb—Touch and pain normal, to heat normal, cold taken for heat.

Face—Touch and pain normal, to heat normal, cold taken for heat.

Astereognosis complete. Position not easily recognized. Paresthesia present.

Case XXXV. Charles Sommers, aged sixty-four years, driver, Jefferson Hospital. Complete right hemiplegia of one and one half years' duration. Movements better in leg than in arm.

Sensations: Upper limb—Touch hypesthesia, pain hypalgesia, heat taken for cold, to cold hypesthesia.

Trunk—Touch hypesthesia, pain hypalgesia, heat taken for cold, to cold hypesthesia.

Lower limb—Touch anesthesia, pain analgesia, heat taken for cold on thigh, anesthesia on leg, to cold anesthesia.

Face—Touch, temperature and pain hypesthesia.

Astereognosis present. Position could not be determined. Paresthesia present.

The disturbances of sensations in these thirty-five cases in order of frequency are:

TOUCH

Upper limb—Hypesthesia (19 cases), normal (11), anesthesia (4), hyperesthesia (1).

Lower limb—Normal (21), hypesthesia (10), anesthesia (5), hyperesthesia (1).

Trunk—Normal (18), hypesthesia (13), anesthesia (4), hyperesthesia (0).

Face—Normal (22), hypesthesia (8), anesthesia (1), hyperesthesia (0).

PAIN

Upper limb—Hypalgesia (25), normal (6), analgesia (5), hyperalgesia (0).

Lower limb—Hypalgesia (21), normal (11), analgesia (2), hyperalgesia (1).

Trunk—Hypalgesia (24), normal (9), analgesia (3), hyperalgesia (0).

Face—Hypalgesia (15), normal (12), analgesia (4), hyperalgesia (0).

TEMPERATURE

Upper limb, heat—Hypesthesia (20), normal (9), anesthesia (8), reversed (4), hyperesthesia (1).

Cold—Hypesthesia (17), normal (9), reversed (5), anesthesia (3), hyperesthesia (3).

Lower limb, heat—Hypesthesia (14), normal (12), anesthesia (8), reversed (3), hyperesthesia (0).

Cold—Hypesthesia (17), normal (13), reversed (4), anesthesia (3), hyperesthesia (1).

Trunk, heat—Hypesthesia (15), normal (11), reversed (5), anesthesia (3), hyperesthesia (0).

Cold—Hypesthesia (15), normal (13), reversed (4), hyperesthesia (3), anesthesia (1).

Face, heat—Normal (14), hypesthesia (12), reversed (2), anesthesia (2), hyperesthesia (1).

Cold—Hypesthesia (13), normal (11), hyperesthesia (3), reversed (2), anesthesia (0).

Astereognosis—Complete in 22 cases, partial in 7 cases.

Position of paralyzed arm—Abnormal in 17 cases, normal in 11 cases.

Paresthesiæ present in 12 cases.

Special senses involved in 11 cases.

The relative frequency of sensory disturbances in different parts of the body:

Upper limb—All three forms of sensations are affected in the majority of cases: for touch we find 24 cases, for pain 30 and for temperature 33 (H) and 28 (C). The hypo-sensations take the greatest number; the anesthesias come next and only a few cases present hyperesthesias. Among the thermic disturbances we find also a reversed condition in some cases, namely, heat is taken for cold and *vice versa.*

Lower limb—The disturbances are as follows: For touch 16 cases, for pain 24, for temperature 25 (H), 25 (C). The hypo-sensations take the largest number, the anesthesias come next, a few present hyperesthesias. As in the upper limb we also find a few cases with a reversed temperature sense.

Trunk—For touch we find disturbances in 17 cases, for pain in 27, for temperature 23 (H), 23 (C). Reversed temperature sense is found in a few cases.

Face—For touch the disturbances are in 9 cases, for pain in 19, for temperature in 17 (H), 18 (C), also reversed temperature sense is present in a few cases.

We therefore see that, without exception, in all the four portions of the body the pain sense suffers most. Next is temperature, and touch is the least affected. There is also no exception to the fact that whether in pain, touch or temperature, the hypo-sensation takes the largest number of cases, while anesthesias are met with in a comparatively small number, the hyperesthesias in extremely few cases.

It will be also noticed that the largest number of cases has the upper extremity affected with sensory disturbances: this is true for each of the three forms of sensations.

In the lower limb touch and pain are affected in a slightly smaller number of cases than on the trunk, except the temperature sense, which suffers more in the leg than on the trunk.

The face is the least affected.

This can be summarized as follows: Touch—Upper limb, trunk, lower limb, face. Pain—Upper limb, trunk, lower limb, face. Temperature—Upper limb, lower limb, trunk, face.

Verger states that the disturbed sensations have a tendency to become normal from the distal end of the limb towards the root. This assertion I found to be correct in a large number of my cases.

The stereognostic sense was disturbed in 29 cases out of 35, in 22 of which the loss was complete. The greater the involvement of the other sensations, the more marked was astereognosis, a fact which tends to favor the conception of the stereognostic sense as depending upon the integrity of the three cardinal sensations. The sense of posture for the upper limb was involved in but 17 cases out of the 35, a fact which leads to the idea that disturbances of other sensations do not necessarily involve the posture sense; this should be particularly emphasized, since the sensations of the upper limb were disturbed in the great majority of our cases.

Verger and others speak of paresthesia and disturbance of the special senses. As to the first I found it present only in 12 cases.

The special senses were involved only in 11 cases. Again the last two symptoms were present only in these cases, in which the other sensations suffered to a great extent.

Accepting the fact that sensory disturbances are present, it is interesting to see in what relationship they are to the degree of motor impairment. In 23 cases in which the impairment of motor power was less marked in the lower than in the upper limb, the majority (15 cases) presented less sensory disturbances; six cases, equal sensory disturbances, and only two more sensory disturbances than in the arm. The reverse is the case with the arm: out of eight cases, in which the motor power was better than in the lower limb, in five the sensory disturbances were more marked, in two they were less marked, and in one—equal to those of the leg.

Can we draw any conclusion in regard to a parallelism between motor and sensory disturbances? Taking into consideration the statement mentioned above, that the sensations are disturbed in a far larger number of cases in the upper limb than in any other portion of the body, and that in the majority of cases the motor power in the upper limb suffers more than in the lower limb, we are warranted to conclude in favor of a certain parallelism between motor and sensory disturbances. In favor of this view speaks also the fact that in those cases in which the motor paralysis was not marked the sensory disturbances were also less marked, and in those cases in which the motor paralysis was much pronounced the sensory disturbances were equally marked.

Is there any relation between the sensory disturbances and the date of the motor paralysis?

I found that in motor palsies of two years', and less, duration, the sensory disturbances are marked in largest number of cases, 13 out of 17. In cases of from two to eight years' duration we find eight in which sensory disturbances are marked, and in three slightly marked. Above this age the sensory disturbances are less marked. It is, therefore, important to note that as a rule the longer the date of motor palsy the less the sensory disturbances are marked.

The results obtained from this study appear to me to be very instructive. Without possessing the pathological data to confirm what my clinical investigations show, can we consider the sensory disturbances in all my cases merely as a coincidence, or as Legroux, Brun, and Mills suggest, that "circulatory disturbances and pressure on neighboring parts beyond those included in the paralyzing lesion account for the impairment of sensation"?

As to the last assertion it is hardly admissible that such a uniformity in the sensory disturbances in my cases should be due to that cause. A great number of cases were recorded by very careful observers in which the lesions were strictly limited to the Rolandic region and in which sensory disturbances were present. On the other hand we know of cases reported by equally careful observers, in which lesions were found in the areas supposed to be sensory while the disturbances were identical with those which were stated in lesions of the Rolandic region.

It is superfluous to go over all the discussions on the sensory localizations. They are too numerous and too well known to the partisans of both doctrines. I merely ask the question: What opinion can we form of the observations in which a lesion strictly limited to the motor area gave sensory disturbances and a lesion of the supposed sensory area gave place also to motor disturbances?

It is true that Dercum and Spiller's case may answer this question but the case is unique and stands isolated, and we have there besides a primary involvement of the *carrefour sensitif,* also one of the lenticular nucleus.

While I was studying these cases, I was surprised at the uniformity of the results, just as if the patients had entered into a mutual agreement to present sensory disturbances. I therefore asked myself, if the negative clinical results obtained by the partisans of the doctrine of separate localizations were really negative, for I found that it is not sufficient to content one's self with the statement that such and such a sensation is present. A persistent and repeated investigation will always (at least in my cases) elicit a more or less marked difference in the condition of the sensations on the paralyzed and non-paralyzed sides.

The writers, against whose views these thirty-five cases speak so loudly, claim that in a number of cases in which hemisensory disturbances were found to be present, they may have been due to hysteria. To avoid such a possible error, I intentionally excluded from my series cases with hysterical stigmata, for which symptoms I examined all the cases offered for my investigation.

However, I included one case (XXII) with distinct hysterical stigmata; here, in spite of the presence of this neurosis, the sensory disturbances are not hysterical in their nature, but of the same character as in the other cases.

A conclusion which forces itself upon me is that hemisensory disturbances, *probably,* always accompany a motor paralysis of cerebral origin no matter to what extent the latter is marked: paralytic or even only paretic symptoms will at the same time show sensory symptoms. The demonstration of this depends upon the method and persistence of the investigation.

If this study does not decide completely the problem of sensory and motor localizations for want of pathological data it may, nevertheless, serve as a guide to those who will have the opportunity to make pathological researches. It will stimulate them to examine very carefully the pathological findings. The clinical facts as described in this essay, cannot, and I hope, will not be ignored, for they are based on impartially and carefully collected observations.

Finally this work may serve its purpose by calling the pathologist's attention to the fact that he cannot be too careful in his deductions upon localizations.

I wish to express my indebtedness to Drs. Spiller, Potts and Dercum for their kind permission to use the material of their respective wards.